

Enhancement of Nanosat Launch Vehicle Booster Main Engine Using 3D Additive Manufacturing Techniques

Completed Technology Project (2015 - 2019)



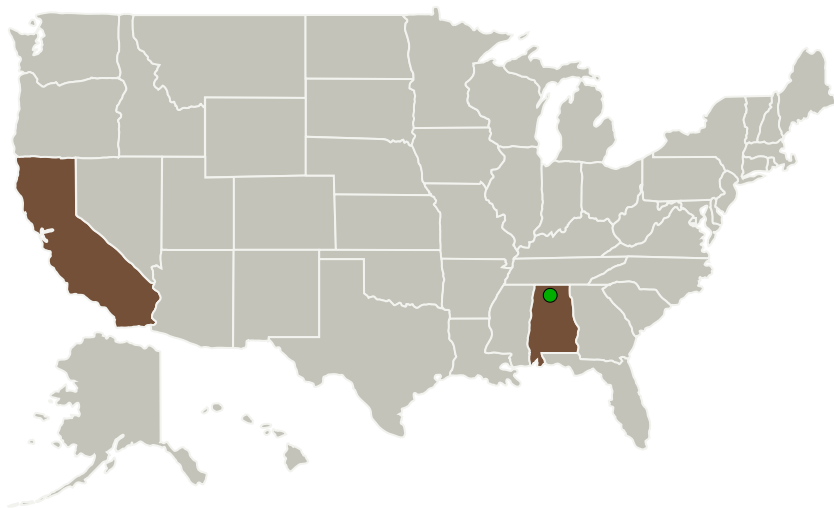
Project Introduction

Applying additive manufacturing (AM) technology in development at NASA MSFC to improve a LOX/propylene booster engine for a nanosatellite launch vehicle. This falls under the scope of Topic 5 and leverage the availability of GSC's existing NLV first stage test vehicle and associated processes and support equipment.

Anticipated Benefits

This will improve a (liquid oxygen) LO1/propylene booster engine for a nanosatellite launch vehicle. These solicitations increase focus on collaborations with the commercial space sector that not only leverage emerging markets and capabilities to meet NASA's strategic goals, but also focus on industry needs. NASA's investments in industry partnerships can accelerate the availability of, and reduce costs for the development and infusion of, these emerging space system capabilities. While developing the technology to enable NASA's next generation of science and human exploration missions, we will grow the economy and strengthen the nation's economic competitiveness.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Vector Space Systems	Lead Organization	Industry	Tucson, Arizona
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions

▶ **November 2015:** Project Start

✓ **April 2019:** Closed out

Closeout Summary: Focused on applying 3-D additive manufacturing to fabricate an integrated injector for a 5,000 lbf-thrust LOX/propylene rocket engine. MSFC provided capabilities in additive manufacturing, as well as design and analysis, to enhance engine performance.

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vector Space Systems

Responsible Program:

Flight Opportunities

Project Management

Program Director:

Christopher E Baker

Program Manager:

John W Kelly

Principal Investigator:

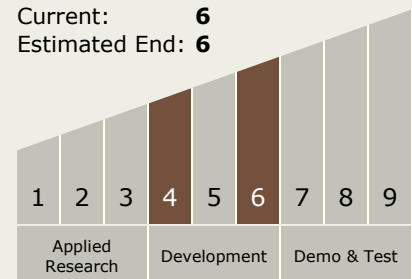
Christopher Bostwick

Co-Investigator:

Stacy M Counts

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



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Target Destination

Earth